Ameritech (SBC) also argued that a zero price for the HFPL would distort the competitive market for advanced services; a result that Ameritech (SBC) stated would be "...contrary to both sound regulatory policy and the express dictates of Section 706 of the Act."[198] Specifically, Ameritech (SBC) argued that a zero price for the HFPL would give a competitive advantage to DSL providers over other advanced services providers that use other technologies.[199] Simply put, Ameritech (SBC) stated, "...establishing a zero price for the monthly HFPL UNE charge will have a damaging impact on the otherwise beneficial development of alternative sources of broadband services, such as broadband wireless and cable modem services."[200] What is more, the company went on to argue, such a price would discriminate against carriers that build their own facilities to provide service and would discourage continued investment in facilities by Ameritech (SBC).[201]

Finally, the ILEC view of the FCC's Orders concerning the HFPL is neatly summarized by John Thorne, a Senior Vice President and Deputy General Counsel of Verizon. According to Mr. Thorne, it was the FCC that ordered ILECs to unbundle the high frequency portion of the loop, and to provide what has come to be called the HUNE very close to free, despite the fact that this unbundling required

> "...the development of a host of new services, including loop "conditioning" services, loop quality information databases, and operations support systems to track and provision the new broadband UNE."[202]

Mr. Thorne went on to argue that the FCC's mandated price for the HUNE reflected neither the actual cost required to provide the channel, nor even the hypothetical TELRIC cost calculation for the provision of advanced services through the HUNE.[203] This pricing, according to Mr. Thorne, has made it easier and cheaper for a competitor to piggyback on an incumbent 's network permanently, instead of building its own network to serve its customers.[204] Mr. Thorne points out that this outcome is a huge

[198] Id. at 86.

[199] Id. at 86-87.

[200] Id. at 87.

[201] Id. 89-92. Ameritech argues that an HFPL price of zero gives the Company "...little incentive to incur actually costs to innovate and invest in its network if it ultimately is required to turn over it facilities to competitors for free."

[202] John Thorne, "The 1996 Telecom Act: What Went Wrong and Protecting the Broadband Buildout", paper presented September 2001 at the Columbia University Conference entitled The Broadband Economy, at 32.

[203] Id.

[204] Id., at 25.

disincentive to the kind of risk-taking required for the infrastructure investments necessary to provide broadband service.[205]

This section has demonstrated that ILECs are advocating that a portion of the cost of the loop be allocated to advanced telecommunications services. In light of this information, NASUCA strongly urges the Commission to rethink its view that all costs should be allocated to voice services. No longer can the Commission contend that it was "not aware of any incumbent LECs that have allocated any loop costs to ADSL services."[206]

7.2 Some State Regulatory Commissions have Interpreted Joint Cost Pricing to Require a non-Zero Price for Voice and non-Voice Services

Although the FCC has established an ILEC's obligation to provide access to the high-frequency spectrum UNE, it is the responsibility of the state commissions to determine the price of this UNE. When considering the pricing of the line sharing UNE there are three sections of the 1996 Telecommunications Act that are of particular interest.

> Section 252(d)(1) of the Act requires that state commission determinations of the just and reasonable rate for interconnection and access to UNEs must be based on the cost of provisioning (determined without reference to a rate-of-return or other rate-based proceeding), must be nondiscriminatory, and may include a reasonable profit.
>
> Section 254 of the Act addresses universal service issues. Subsection 254(k) states that a telecommunications carrier may not use services that are not competitive to subsidize services that are subject to competition. State commissions, with regard to intrastate services, must ensure that services that are included in the definition of universal service bear no more than a reasonable share of the joint and common costs of facilities used to provide those services.
>
> Section 706 of the Act requires each state commission to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans . . . by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."

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[205] Id., at 26.

[206] CALLS Order at ¶98.

Since the issuance of the CALLS Order several local exchange carriers have asserted and their several State Regulatory Commissions have, in fact, concluded that allocating loop costs to the high-frequency portion of the loop, and the services provided thereon, was reasonable, and was a matter of sound economics, not to mention correct public policy. A number of State Regulatory Commissions have concluded that the cost of the loop should be recovered from all switched services.

For example, In Connecticut, SBC Communications Inc.'s affiliate, Southern New England Telephone Company (SBC/SNET), proposed a rate for the shared portion of the loop that equated to 50% of the rate for the xDSL capable loop.[207] In support of this rate, SNET argued that a reasonable rate calculation, taking into account the forward-looking cost of capital, depreciation, and a reasonable profit, is unlikely to be zero.[208]

Furthermore, SBC/SNET went on to argue, the FCC's Line Sharing Order explained, "...when a single loop facility is used to provide both Telco voice service and CLEC advanced services, the loop generates a cost that is shared by these two uses. Because a single loop is shared between providers and services, there is no economically unique way to establish the loop cost that each service causes. Since cost causation cannot be established between the high frequency portion of the loop (HFPL) and the voice portion of the loop, pricing of the two uses necessarily requires an allocation of the shared loop cost."[209] According to SBC/SNET, the allocation that makes the most sense, as mentioned above, is allocating 50% of the loop-related costs to the provision of xDSL service.

The Connecticut Department of Public Utility Control (CT DPUC) agreed with these arguments and found that:

> "...the loop costs can be reasonably allocated among the services that use the loop. Obviously, the loop was constructed for more than basic local exchange service and cannot be considered the sole cost responsibility of basic local exchange service. New uses of the loop must be encouraged and should reasonably share in the cost of providing the loop."[210]

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[207] Before the State of Connecticut Department of Public Utility Control, Reply Brief of the Southern New England Telephone Company, In the Matter of Application Of The Southern New England Telephone Company For A Tariff To Introduce Unbundled Network Elements, Docket No. 00-05-06, November 28, 2000, at 3.

[208] Id., at 4.

[209] Id., at 10. HFPL here refers to the high-frequency portion of the loop that is used to provide the high-frequency spectrum UNE, the HUNE.

[210] See Application of the Southern New England Telephone Company for a Tariff to Introduce Unbundled Network Elements, Connecticut Department of Public Utility Control Docket No. 00-05-06, dated June 13, 2001 at Page 20.

The CT DPUC went on to find that an "...allocation of 50% of the local loop costs is reasonable for the high frequency portion of the loop".[211]

Similarly, in Washington, Qwest Corporation argued that it believed that Section 254(k) of the Act requires that a reasonable allocation of the joint and common costs of the loop be made to the high-frequency portion of that loop in order to ensure that:

> "...services which are included in the definition of universal service bear no more than a reasonable share of the joint and common costs of facilities used to provide those services."[212]

Qwest went on to emphasize that:

> "The Commission can ensure consistency with this requirement by pricing the high frequency portion of the loop in such a way that it bears a reasonable share of the joint and common costs associated with the provision of that element. As discussed below, the entire loop is a joint cost of providing the two dedicated connections to allow line sharing. As such, failure to reasonably allocate a portion of that cost to the high frequency portion of the loop will result in other elements and services bearing a disproportionate share of those costs."[213]

Qwest went on to argue that, according to the Eighth Circuit's decision in Iowa Utilities Board v. FCC, No. 96-3321 (8th Cir. July 18, 2000), it is Qwest's actual experiences in real central offices that provides the most reasonable benchmark for determining costs.[214] As Qwest pointed out:

> "1) line sharing recasts the loop cost as a cost that is common to two dedicated connections on a shared line; and
>
> 2) the FCC established that the cost-based price of an unbundled network element should recover a reasonable portion of common costs."[215]

Following up on this line of reasoning, Qwest proposed allocating 50% for the high frequency portion of the loop as being just and reasonable and consistent with the FCC's pricing principles, which were designed to "...foster fair and equal competition

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[211] Id.

[212] Before the Washington Utilities and Transportation Commission, In the Matter of the Continued Costing and Pricing Of Unbundled Network Elements And Transport And Termination, Docket No. UT-003013 Part A, Opening Brief of Qwest Corporation, October 9, 2000, at ¶¶10-11.

[213] Id.

[214] Id., at ¶34.

[215] Id., at 41.

among providers and to foster technological innovation through investment in telecommunications facilities."[216]

At the end of its investigation of this matter, the Washington Utilities and Transportation Commission concluded that adoption of a non-zero high-frequency spectrum UNE rate was necessary because:

> "...the loop is used to provide both basic exchange and advanced telecommunications service, recovering the entire cost of the loop from voice services would violate Section 254(k) of the Act. Because the cost of the loop is considered to be a shared cost for the provision of voice and advanced services, we conclude that a portion of the cost of the loop should be recovered from LECs providing advanced services and specifically digital subscriber line services."[217]
>
> "Networks are increasingly being designed at this time to provide advanced telecommunication services. Due to the more stringent technical requirements of providing advanced telecommunications services, the incremental cost of these products is not zero. Therefore, we believe it is appropriate to recover a portion of the cost of the loop from LECs providing advanced telecommunication services."[218]

In California, the Public Utilities Commission, in an interim decision that analyzed the issue in enlightening detail, also found that a zero cost for the HUNE was unreasonable for the following reasons:

1. Taking into account the forward-looking cost of capital and economic depreciation, including a reasonable profit, it is presumptively unreasonable to find a just, reasonable, and nondiscriminatory interim rate for use of the high frequency portion of the loop to be zero;

2. Taking into account a reasonable allocation of joint and common costs, in the interim, including forward-looking common costs, it is presumptively unreasonable to find a just, reasonable, and nondiscriminatory interim rate for use of the high frequency portion of the loop to be zero; and

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[216] Id., at ¶¶43-46.

[217] See In the Matter of the Continued Costing and Pricing of Unbundled Network Elements, Transport, and Termination, Thirteenth Supplemental Order - Phase A, WUTC Docket No. UT-003013, released January 2001, at Paragraph. 57.

[218] Id., at Paragraph 60.

3. "ILECs are now devoting billions of dollars to initiate broadband service capable of meeting all of their customers' needs for not only voice, but also data, and other products and services. Even if ILECs allocated no direct costs in years past when they established price floors for their ADSL retail services, this does not necessarily make zero a correct TELRIC calculation today for data transport over the local loop in the year 2000 and beyond. That is, it is not unreasonable that TELRIC for the loop calculated today based on a system designed to serve all of a customer's needs, including data as well as voice, might include some costs (e.g., capital, profit, economic depreciation, common, joint) for services other than voice. In fact, *if transport of data is the future of telecommunications, it may be that xDSL services on the high frequency portion of the local loop cause all future loop costs, and voice services cause none.*"[219]

To date, the HUNE rates set either by State Commission Order, or via an ILEC SGAT offering, range from a low of $3.00 in California[220] to a high of $13.70 in Montana.

We expect that more and more states will impose charges in the future as the technology for providing advanced data services expands. If State Commissions do not set reasonable and cost-based prices for the high-frequency spectrum UNE this will discourage competition, efficiency, and investment in the telecommunications infrastructure (as illustrated in the Section 7.6 discussion of the wireless and satellite carriers having to purchase spectrum for their data and video services).

7.3 A Few State Commissions Interpret the FCC's Order's as Mandating a Zero Price for the High-Frequency Portion of the Loop

There apparently is some confusion as to what the FCC's orders actually mandate, as a few state commissions have interpreted those orders as requiring them to establish a zero price for the HFPL. For example, the Texas State Commission, in an interim order, found that a zero rate for the HFPL would best address the FCC's concern regarding a

[219] Before the Public Utilities Commission of the State of California, In the Matter of Rulemaking on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish a Framework for Network Architecture Development of Dominant Carrier Networks and Investigation on the Commission's Own Motion Into Open Access and Network Architecture Development of Dominant Carrier Networks, Interim Opinion, Decision 00-09-074, Rulemaking No. 93-04-003 and Investigation No. 93-04-002 (Interim Arbitration, Line Sharing Phase) September 21, 2000, at 16-18 (emphasis added). The Commission is currently in the process of establishing final UNE and HUNE rates in this proceeding; Rulemaking No. 93-04-003 and Investigation No. 93-04-002 (Interim Arbitration, Line Sharing Phase).

[220] This $3.00 monthly recurring charge for the high-frequency portion of the loop applies to Verizon. The CA PUC set monthly recurring charge for the high-frequency portion of the loop of $5.85 for SBC (PacBell) of California.

potential price squeeze and would also be consistent with the general pro-competitive purpose underlying the TELRIC principles.[221]

The Minnesota Public Utility Commission (MNPUC) similarly interpreted the FCC's orders to mandate a zero price for the HFPL. In arriving at this decision the MNPUC took note of the fact that U S West, in documents filed with the FCC when it first offered retail DSL service, stated that because the cost of the loop is attributed to basic service there is no incremental cost of the loop attributable to the provision of DSL service. This being the case, the MNPUC argued, the MNPUC was legally obligated to set the HUNE price at zero in order to comply with the FCC's ruling that "...a LEC should provide line sharing to CLECs 'on the same terms and conditions (including pricing, processes and services) that it provides to itself.'"[222]

Regarding the FCC's pricing rules concerning the allocation of joint and common costs to the HFPL, the MNPUC believed that "[t]he FCC rejects the argument that its rules mandate allocating joint and common costs to the HUNE".[223]

Likewise the New York Public Utilities Commission found that because Bell Atlantic's cost studies for its retail Infospeed DSL offering included no allocation of loop costs, the Commission was obligated to approve a zero price for the HFPL.[224] Verizon, which proposed a zero loop rate for the HFPL, echoed this position, consistent with what it believed was demanded by the FCC's Line Sharing Order.[225] However, the Company reserved the right to revisit this issue if its cost studies were ever modified.[226]

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[221] Before the Public Utility Commission of Texas, In the Matter of Petition of IP Communications Corporation To Establish Expedited Public Utility Commission of Texas Oversight Concerning Line Sharing Issues and Petition of Covad Communications Company and Rhythms Links, Inc. Against Southwestern Bell Telephone Company and GTE Southwest Inc. for Post-Interconnection Dispute Resolution and Arbitration Under the Telecommunications Act Of 1996 Regarding Rates, Terms, Conditions and Related Arrangements For Line Sharing, Docket Nos. 22168 & 22469, Interim Award, June 2000, at 22.

[222] Before the Public Utility Commission of Minnesota, In the Matter of a Commission Initiated Investigation into U S WEST Communication, Inc.'s Costs Related to the Provision of Line Sharing Services, Docket N. P-5692, 5710, 5827, 5638, 5670,466,421/CI-99-1665, Order Setting Prices for Unbundled Network Elements, July 24, 2001, at 7.

[223] Id. at 11.

[224] Before the State of New York Public Service Commission, Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements, CASE 98-C-1357, OPINION NO. 00-07, Opinion And Order Concerning Line Sharing Rates, May 26, 2000, at 9.

[225] Id.

[226] Id. As was pointed out above, Verizon seems to have moderated its position as it has more recently found that there are, in fact, direct costs associated with the provision of xDSL service.

7.4 Pricing Policy for the High-Frequency Spectrum UNE Should be Set in a Way to Prevent Price Squeezes

A price squeeze occurs when an integrated firm with market power adjusts the margin between wholesale and retail prices in order to have a competitive advantage over its non-integrated competitors. ILECs (and CLECs) that provide voice services could conceivably use a price squeeze in the provision of advanced telecommunications services since loop costs can also be recovered from voice services. They can price advanced telecommunications services below competitors (e.g., providing cable modem, broadband) who do not also provide voice services.

Consequently, although we support a non-zero price for the high-frequency spectrum UNE, regulatory authorities must be careful not to set this price too high. Otherwise, companies that provide voice-services could have a competitive advantage over those that do not, since the latter cannot use voice-services to cross-subsidize non-voice services. As pointed out by the FCC, a price squeeze can be avoided if a CLEC provides both voice and data services. [227] For those carriers that only provide DSL service, a price squeeze can be avoided through imputation.

7.5 A Non-Zero Price for the High-Frequency Portion of the Loop Need Not Result in a Price Squeeze

The FCC and others have expressed their concern that a non-zero price for the high-frequency portion of the loop could result in a price squeeze, as the ILECs could set the retail rates for their own xDSL services below the sum of direct costs plus the HUNE charge it would not have to pay. For example, the Washington Utilities and Transport Commission found:

> "Qwest's MegaBit product retails at $29.95 and that the direct costs of providing MegaBit are $17.32. That leaves Qwest with a margin of $12.63 with which to cover common costs and earn a profit. Assuming that a competing CLEC prices its comparable DSL product at $29.95, and further assuming that the CLEC incurs the same direct costs as Qwest, if that CLEC is required to pay an additional $9.08 (50% of Qwest's non-deaveraged unbundled loop rate) for the HUNE, it will be left with $3.55 to cover common costs before profit."[228]

[227] Before the Federal Communications Commission, In the Matter of GTE Tel. Operating Cos. GTOC Transmittal No. 1148, CC Docket No. 98-79, FCC 98-292, Memorandum Opinion and Order (rel. Oct. 30, 1998) ("GTE-DSL Order") at ¶31GTE-DSL Order at Paragraph. 31

[228] Before the Washington Utilities and Transportation Commission, In the Matter of the Continued Costing and Pricing of Unbundled Network Elements, Transport, Termination and Resale, Thirteenth Supplemental Order, Docket No. UT-003013 (Phase A) (W.U.T.C. January 31, 2001) ("WA Line Sharing Order"), at ¶52.

The threat of such a price squeeze, as the Washington Commission recognized, can be dealt with by the imposition of an imputation requirement. Thus, in Washington, Qwest proposed to avert a price squeeze by "...agreeing to price its MegaBit service higher than the sum of its direct costs plus an imputed amount for the HUNE".[229] The Washington Commission agreed with this suggestion and required Qwest to "...submit evidence to this Commission showing that any proposed changes to the retail price of its advanced telecommunications services pass an imputation test."[230]

As pointed out by Qwest, such an approach appeared to be supported by the FCC in its Line Sharing Order at footnote 326 where it noted that "... the Minnesota PUC held that it was 'not presently concerned with how [U S WEST] resolves the pricing issue, so long as the Company charges data CLECs the same loop rate that the Company presently *imputes* to its own DSL services." (Emphasis added)[231]

For these reasons, we believe that establishing a non-zero price need not result in a price-squeeze and therefore it is inappropriate to recover none of the cost of the loop from non-voice services.

7.6 Pricing Policy Should Promote Dynamic Efficiency in the Telecommunications Market

The rate of technological change and innovation depend on market incentives. Provided that pricing policies are not overly restrictive and do not favor particular technologies or services, additional competition in telecommunications will stimulate the development of new technologies, and promote efficient investment. This will be the case for incumbents and CLECs alike.

The impact of pricing policies that do not charge for the high-frequency spectrum UNE are summarized as follows by Qwest:

> "In telecommunications, CLECs are investing very little in loop facilities to residential customers and small business customers outside of the major business centers. Setting artificially low prices for high-frequency spectrum use could have a negative impact on the incentives for CLECs to construct their own facilities to serve these customers. Low prices for use of the high-frequency spectrum on loops could also have a chilling

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229 Id. at ¶67.

230 Id.

231 Before the Washington Utilities and Transportation Commission, In the Matter of the Continued Costing and Pricing Of Unbundled Network Elements And Transport And Termination, Docket No. UT-003013 Part A, Opening Brief of Qwest Corporation, October 9, 2000, at ¶62.

> effect on cable-based and wireless investments to provide high-speed Internet access in some geographic areas.
>
> Like xDSL-based competitors, cable-based and wireless competitors are responding to the rising demand for high-speed access. A key difference is that these competitors are responding with facilities investments. High capacity access across the traditional landline network is in direct competition with cable modem and broadband wireless services, and this competition is expected to intensify. It is not difficult to see how the incentives to make cable-based facilities investments may be dampened in some geographic areas and customer segments if competitors can obtain high-frequency spectrum UNEs for a very low price."[232]

Section 706 of the 1996 Telecommunications Act instructs commissions to "adopt policies that will promote advancement of advanced telecommunications services". Establishing a zero price for advanced services fails to satisfy the goal of Section 706. This is because a zero price would not promote the use of advanced services UNEs on a competitively neutral basis, and would give xDSL providers a competitive advantage over other types of high-speed Internet access providers, such as satellite and cable companies, who must pay for the facilities they use to provide high speed data services. Moreover, a price of zero for the advanced services UNE might afford xDSL providers the opportunity to engage in precisely the type of price squeeze against competing technologies that the FCC feared the incumbent LECs could impose against the xDSL providers.

A zero price for advanced services also fails the goal of Section 706 because it reduces the incentive for <u>all</u> providers to invest in new infrastructure and new technology. Alternative providers of high-speed data services will have a reduced incentive to invest if they are competing against xDSL providers whose operations are in effect subsidized because they do not pay for their essential facility. Further, the xDSL providers themselves will have significantly reduced incentive to build their own facilities and to invest in alternative technologies if they can access the existing high frequency loop for free.

Clearly, because all of the various technologies and companies involved in the telecommunications sector compete in one way or another with each other, pricing policy has far-reaching implications beyond its immediate target. Impacts extend to xDSL providers, CLECs, cable modem, wireless, broadband services, and ILEC investment decisions. The overall rate of innovation will be slowed in advanced data services so long as the high-frequency spectrum is underpriced in a way that favors certain technologies and consumers.

[232] Testimony of William L. Fitzsimmons, May 19, 2000. Before the Washington Utilities and Transportation Commission <u>In the Matter of the Continued Costing and Pricing of Unbundled Network Elements and Transport and Termination</u> (DOCKET NO. UT-003013).

Provision of non-voice services is more competitive than competition in voice services, which is very much dominated by ILECs. Therefore, increasing Subscriber Line Charges would disproportionately favor the ILECs who can use their integrated provision of voice and non-voice services to a competitive advantage by cross-subsidizing non-voice services. Only integrated companies, like ILECs, which provide voice and non-voice services, can use one service to cross-subsidize another. ILECs would be able to use increases in the Subscriber Line Charge, which would primarily be borne by voice-users, to recover expenses incurred in providing non-voice services.

8 Today's Public Switched Telephone Network (PSTN) Has Been Constructed for the Provision of Non-Voice Advanced Services, and the Subscriber Line Charge Pricing Policy of the Commission Needs to Reflect This Fact

Throughout its history, the design of local exchange plant facilities has undergone successive transformations to meet the needs of premium communications services that utilize this plant in common with the provision of basic local exchange service.[233]

In today's world, the demand for non-voice services has become the driving force behind the evolution of the network into an integrated multiservice and multifaceted network capable of providing a variety of products such as voice, video, and data. A prime example of this trend is SBC's Project Pronto initiative -- an undertaking the Company intends as "...an important step in the company's migration to a converged voice, data, and video network, which ... dramatically increases the efficiency of the network and provides end-users with a powerful, single source for all of their communications needs."[234] As this type of network integration speeds up, the argument that the cost of the local loop is caused by a customer's decision to have basic telephone service, whether or not the customer purchases other services as well, is becoming increasingly untenable.

It has been argued that "[j]ust as a person must buy a car regardless of whether she drives to work every day or merely drives to church every Sunday, a customer who does not use the phone very often still needs the entire loop to have any service at all."[235] As the network is re-engineered to cater to the needs of advanced service users,

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[233] See, for example, Richard Gabel, "The Impact of Premium Telephone Services on the Technical Design, Operation and Cost of Local Exchange Plant", January 1992, Policy Paper C-30, Public Policy Institute—Division of Legislation, Research, and Public Policy of the American Association of Retired Persons (AARP) and Grant Lenahan, Executive Director, NGN Solutions, Bellcore, Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998

[234] SBC's $6 Billion Project Pronto Initiative Brings DSL Internet to 80% of its Customers, SBC Communications Inc. Press Release, available from http://www.sbc.com/data/network/0,2951,5,00.html

[235] Before the Public Utilities Commission of the State of California, In the Matter of Rulemaking on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish a Framework for Network Architecture Development of Dominant Carrier Networks and Investigation on the Commission's Own Motion Into Open Access and Network Architecture Development of Dominant Carrier Networks,

a customer who might only want to drive a low-end Volkswagen is being asked to bear the costs of providing a high end Jaguar to someone else.

Put another way, a customer who might only want to buy a car to drive to church on Sunday, has a variety of low priced car options to choose from to suit that purpose. A person who wants to purchase a phone for basic local and long distance voice service does not have that option. Instead, what that person is increasingly being asked to do is to pay for access to an advanced services network, which just happens to provide voice as one the many services that are offered.

The engineering history of the public switched network is provided because the Commission stated that it was interested in identifying the cost of providing voice access to the public switched network. Section 8 of this submission demonstrates that today's network is being designed to meet the more stringent technical requirements of non-voice services. NASUCA calls on the Commission to exercise its responsibility to prevent voice services from providing a subsidy or support to these non-voice products.

8.1 The PSTN Has Gradually Evolved Towards an Advanced Services Network

Any discussion of the evolution of today's network must begin with an understanding of the fact that voice and data services impose different technical requirements and costs on the local network. The demands of data communication are fundamentally different from the demands of voice communication. For example, data, video, and audio require much more speed and bandwidth than voice in order for transmission to be fully effective.[236] In addition, data communication requires higher quality signals because computers cannot filter out noise on the line in the same way that a human ear can. This was especially a problem on analog networks as amplification of the analog wave, which is required periodically to overcome resistance and to boost the signal (the voice or data transmission), amplified both the signal as well as the noise. Such noise amplification had great potential to cause errors in data transmission.[237]

Digital technology was seen as a solution to the problems presented by the analog network in that digital signals provide clearer voice quality but, more importantly, digital signals enable higher speed transmission with fewer errors because noise is not regenerated when the signal is amplified as it is in an analog signal.[238] Digital

Rulemaking 93-04-003 and Investigation 93-04-002 (Interim Arbitration, Line Sharing Phase), Opening Brief of Verizon California Inc., July 27, 2001, at 9.

[236] Typically, the 3 Kilohertz (KHz) range typifies the upper limit required for voice transmission. Compare this with cable modem frequencies that have upstream frequencies of between 5 and 42 Megahertz (MHz) and downstream frequencies of between 50 and 750 MHz.

[237] Dodd, Annabel Z., The Essential Guide to Telecommunications (Second Edition), 2000 Prentice Hall PTR, at 7.

[238] Id.

technology has other benefits as well in that it is more reliable than analog service since fewer signal amplification points are needed with digital technology. Fewer amplification points mean fewer failure points, lower maintenance costs and hence, greater reliability. An additional benefit of the advent of digital technology, and one which the Bell System was eager to capitalize on, was that the expensive process of individually engineering private-line loops could be done away with.[239]

These advantages led to the digitization of the telephone network beginning in the 1960's with the introduction of the T-1 carrier system, which was capable of carrying 24 voice or data calls in digital format. This was seen as the start of the Bell System's evolution towards what was called the Integrated Services Digital Network (ISDN), which Bell System engineers and managers envisioned would eventually evolve the network into a general purpose service providing platform capable of offering services such as audio, image, video, and interactive data over one totally integrated network.[240] Bell System engineers and managers advocated evolving the network in this direction as a response to three major factors: technology trends, performance requirements, and the demand for new services with a data orientation.[241] It was projected that aggregate growth rates for these new services, especially the demand for digital data services, was going to increase dramatically by the mid 1980s.[242]

It was recognized early on that these new digital services would place transmission demands upon the loop plant that could not be accommodated without specific loop conditioning and/or circuit rearrangements and that the digital network could only reach its full potential by being engineered to reflect the special requirements of non-voice services.[243] It was anticipated that many of these services would operate simultaneously

[239] Byrne, et al., 2006; G.J. Handler and D. Sheinbein, "Improving the Loop to Provide New Network Capabilities," in Proceedings 1982 International Symposium on Subscriber Loops and Services (New York: IEEE, 1982), 1-1; Arvina Karia and Salvatore Rodi, "A Digital Subscriber Carrier System for the Evolving Subscriber Loop Network," The Institute of Electrical and Electronics Engineers, Inc. Transactions on Communications 30 (September 1982), 2013; and Testimony of Leon J. Titman on Behalf of New York Telephone, New York Public Service Commission Proceeding on Telephone Services that Bypass Local Exchange or Toll Networks (28710), December 11, 1984, 2657.

[240] C.S. Skryzpczak and J.H. Weber, American Telephone and Telegraph Company, W.E. Falconer, Bell Telephone Laboratories, Bell System Planning of ISDN, IEEE International Conference on Communication: Denver Colorado, Vol. 1 of 4, 1981 at p. 19.6.1; and E.A. Smith, W.A.G. Walsh, and M.J. Wilson, How Non-voice Services Affect the Evolution Toward the ISDN, Telephony, June 14, 1982, at 44; The desired goal of an integrated single multifunction network, rather than multiple networks supporting circuit switching, packet switching, and various private line services was also articulated in various internal bell company documents around 1988. See, for example, Architectural Implications of High Speed Private Line Services in an Evolving ISDN Environment, BellCore Document # TM-NPL-013390, December 23, 1988.

[241] Id., at Paragraph 19.6.2. It should be recalled that IBM began selling digital computers in the 1950s, Microsoft was founded in 1975 and Apple introduced the first personal computer in 1977.

[242] Id., at Paragraph 19.6.1.

with the normal voice band Plain Old Telephone Service (POTS); consequently, at least two information channels (voice and data) to the customer were seen as being required.[244] It was recognized that this would require access lines with transmission standards quite different from the traditional POTS service. Because up to that point in time the network had been basically designed for POTS circuits it was also recognized that this would require the network to be conditioned on a service order basis, to meet the needs of the many special service circuits required for non-voice services.[245] This type of provisioning was viewed as unsatisfactory because of the expense involved and the delay it introduced in the delivery of the new digital services. These factors, coupled with the uncertainty involved in projecting demand for the new services, caused Bell System engineers and managers to seek a more generic positioning approach to the subscriber loop plant; one which would enable the efficient provisioning of both digital and analog services, essentially special services and POTS.[246] The approach advocated by Bell System engineers, and eventually adopted widely throughout the network, as being the most efficient and economical in terms of network resources and capital investments was the use of Digital Line Carriers (DLCs) positioned according to the carrier serving area (CSA) network design concept.[247]

This approach drastically altered the way the local loop was engineered. Previously the loop had been designed according to the Revised Resistance Design (RRD) standard. This standard set maximum loop resistance at 1500ohms, placed loading coils on all loops over 18K ft, and applied to loops originating at the central office.[248] Load coils were required on these long loops to compensate for loss and frequency response; unfortunately, they also eliminated signals above 4 kilohertz. While this bandwidth was perfectly acceptable when the only use of the loop was voice transmission it was not acceptable for the provision of non-voice digital services, such as data and Electronic Key phone type services, that required the ability to utilize higher frequencies.[249] The CSA network design concept changed all that.

[243] T.P Byrne, R. Coburn, and H.C. Mazzoni, American Telephone and Telegraph Company, G.W. Aughenbaugh and J.L. Duffy, Bell Telephone Laboratories, "Positioning the Subscriber Loop Network for Digital Services", A Paper Presented at the International Symposium on Services and Local Access (ISSLS) Conference in Toronto, September 20-24, 1982 at 71; and E.A. Smith, W.A.G. Walsh, and M.J. Wilson, How Non-voice Services Affect the Evolution Toward the ISDN, Telephony, June 14, 1982, at 44.

[244] Id.

[245] Id.

[246] Id., at 71-72.

[247] Id., at 72.

[248] *Ex parte* filing of U S West on Loop Design Issues, Sponsored by U S West, Sprint, and Bellsouth, filed in FCC Docket CC 96-45 and CC 97-160, October 8, 1997, at 5.

[249] Electronic Key phone services are typically used by businesses to route phone calls between people within an organization and phone calls to and from staff from the public switched network. These services utilize signaling frequencies in the 8KHz range. (See Dodd, Annabel Z., The Essential Guide to Telecommunications (Second Edition), 2000 Prentice Hall PTR, at 41-51.)

A CSA is a distinct geographical planning area capable of being served by a DLC whose maximum permissible outer bounds are determined by the serving distance over copper of unrepeated 64 kilobytes/second, and lower digital data service and by POTS loading considerations.[250] In other words, it is "...an area in which every customer has access to DS0-level digital services to include the capability of providing locally-switched voice-grade exchange service, special services, and the ISDN without special circuit design."[251] This means that the maximum loop length in a CSA is 12k ft for 19-, 22-, and 24-gauge cables and 9k ft for 26-gauge cables. [252] At these break points, remote DLC terminals are placed. [253] Fiber is then run from the central office to the DLC; this is the feeder portion of the loop, and Copper is run from the DLC to the customer premises; this is the distribution portion of the loop. By shortening the copper loop lengths serving customers in the CSA, and by pushing fiber and network electronics farther out into the network, the CSA design obviated the need for loading coils and other impediments,[254] which hampered the delivery of advanced services over the network. This especially benefited emerging technologies such as low bit rate data above voice and digital subscriber line (DSL), which were two technologies deemed at the time as having considerable potential.[255]

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[250] T.P Byrne, R. Coburn, and H.C. Mazzoni, American Telephone and Telegraph Company, G.W. Aughenbaugh and J.L. Duffy, Bell Telephone Laboratories, "Positioning the Subscriber Loop Network for Digital Services", A Paper Presented at the International Symposium on Services and Local Access (ISSLS) Conference in Toronto, September 20-24, 1982 at 72.

[251] Telecommunications Transmission Engineering (Third Edition), Volume 3: Networks and Services, Bellcore 1990, at 109.

[252] T.P Byrne, R. Coburn, and H.C. Mazzoni, American Telephone and Telegraph Company, G.W. Aughenbaugh and J.L. Duffy, Bell Telephone Laboratories, Positioning the Subscriber Loop Network for Digital Services, A Paper Presented at the International Symposium on Services and Local Access (ISSLS) Conference in Toronto, September 20-24, 1982 at 72; and Telecommunications Transmission Engineering (Third Edition), Volume 2: Facilities, Bellcore 1990, at 94.

[253] Id.

[254] Another impediment that was addressed by this design was bridged taps. Bridged taps permit the same copper wire to feed multiple locations. Digital services require the use of fewer bridged taps. (T.P Byrne, R. Coburn, and H.C. Mazzoni, American Telephone and Telegraph Company, G.W. Aughenbaugh and J.L. Duffy, Bell Telephone Laboratories, Positioning the Subscriber Loop Network for Digital Services, A Paper Presented at the International Symposium on Services and Local Access (ISSLS) Conference in Toronto, September 20-24, 1982 at 71)

[255] C.S. Skryzpczak and J.H. Weber, American Telephone and Telegraph Company, W.E. Falconer, Bell Telephone Laboratories, Bell System Planning of ISDN, IEEE International Conference on Communication: Denver Colorado, Vol. 1 of 4, 1981 at p. 19.6.4. It should be noted that the CSA design in still in use today. For example, Sprint has stated that it utilizes CSA design standards in its actual network planning and design. (Sprint Corporation Cost Submission, Before in the Federal Communications Commission, In the Matter of Access Charge Reform, CC Docket No. 96-262, and Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, Submitted November 16, 2001, at 9.)

The adoption of these new technologies and network designs had a significant impact on the obsolescence rate of the physical plant. A depreciation rate study performed by New England Telephone and Telegraph Company (NETT) noted that the use of fiber optic transmission would sharply reduce not only the future life expectancy of the cable accounts, but the conduit account as well and called for the prescription of significantly shorter service lives to deal with the fact that obsolescence was increasing at a faster rate due to the advent of newer technologies.[256] The company went on to call for higher depreciation rates in anticipation of much faster retirement of all kinds of telephone plant than had previously occurred.[257]

The driving force behind this increase in plant retirement, according to NETT, was the fact that the emerging fiber optic transmission medium was expected to significantly change the outside plant network. NETT stated that the increasing use of fiber would be "...stimulated by the expanding needs of the homes and offices of the future to include voice, video, and data covering a wide range of new services for which fiber will provide an economically viable medium compared to copper wire."[258]

These early steps towards a new integrated network architecture based on the Integrated Services Digital Network concept and utilizing the CSA network design standard for local loop plant engineering, although improving network efficiency, imposed considerable costs on the network; costs which were primarily incurred so as to enable the network to provide non-voice advanced services. For example, a couple of the RBOCs claimed that the total cost of their ISDN deployment was $1 billion; this cost included upgrading their switches (from analog to digital) as well as their transmission networks to support ISDN.[259]

8.2 The Proliferation of Computers, the Development of Computer Networking, and the Advent of the Internet has had a Major Impact on the PSTN

By 1989, 12 years after the introduction of the first personal computer by Apple in 1977, only about 12% of households in the US had a computer.[260] However, this started to rapidly change in the 1990s. The World Wide Web was born at the end of 1990, and, by

[256] New England Telephone and Telegraph Company 1981 Depreciation Rate Study, Rhode Island, Issued November 1980, at 4.

[257] Id., at 11.

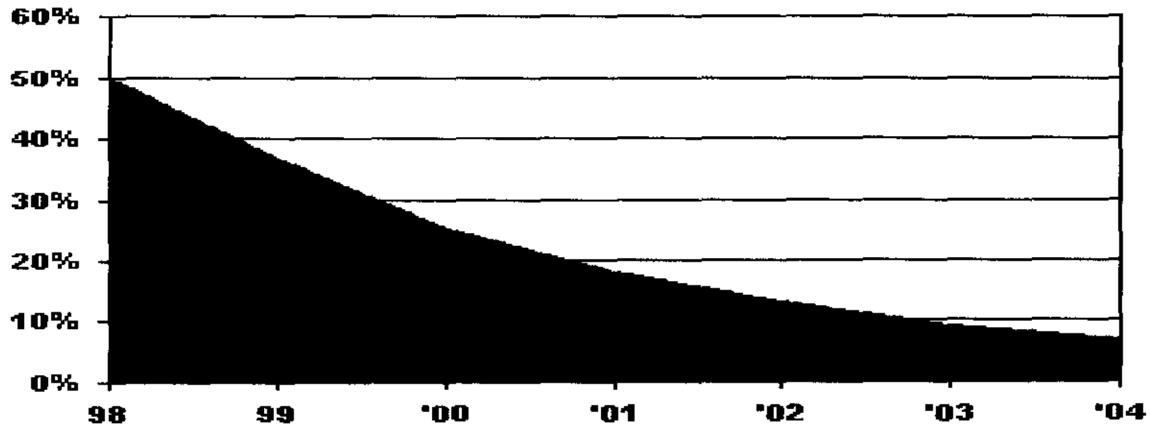
[258] Id., at 10.

[259] Bob Larribeau. The Lessons of ISDN, June 24, 1998 available at http://www.ksg.harvard.edu/iip/ngct/larribeau.html, at 7.

[260] Crandell, Robert W. and Charles L. Jackson, The $500 Billion Opportunity: The Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access (A Criterion Economics, L. L. C. Report Sponsored by Verizon) , July 2001 at 7.

1994, the term *Internet* entered the household lexicon.[261] During that time period, the number of Internet hosts had increased from approximately 159,000 in 1989 to 1.8 million by July of 1993.[262] By 1997, the number of Internet hosts had increased to 26.053 million[263] and over 30% of US households had a computer.[264] One year later data traffic surpassed voice traffic on the PSTN in both the US and the United Kingdom.[265]

Figure 2 – Data Traffic is Growing to Dominate all Public Network Traffic



(shaded = voice component of total PSTN traffic, data from 1999 and beyond are estimates)

Source: Next Generation Networks: A Practical View of Network Evolution, by Grant Lenahan, Executive Director, NGN Solutions, Bellcore

By the late 1990s confronted by the rapid increase in demand for data networking services from business customers as well as households that wanted to access the Internet, carriers began once again to look for a way to manage multiple services on a

[261] Id.

[262] David, Paul A., The Internet and the Economics of Technology Evolution, September 28, 1999, at 3.

[263] Id. As of July 2001, the number of Internet hosts had increased to 125.9 Million (Internet Domain Survey, July 2001 available at http://www.isc.org/ds/WWW-200107/index.html)

[264] Crandell, Robert W. and Charles L. Jackson, The $500 Billion Opportunity: The Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access (A Criterion Economics, L. L. C. Report Sponsored by Verizon) , July 2001 at 10.

[265] Lenahan, Grant (Executive Director, NGN Solutions, Bellcore), Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998; and Dodd, Annabel Z., The Essential Guide to Telecommunications (Second Edition), 2000 Prentice Hall PTR, at 286.

common network infrastructure.[266] This was being necessitated by: 1) Simple economics -- carriers recognized that competitive pressures would not permit them to continue to build, operate, and provision separate networks for data and voice for too much longer;[267] 2) The explosion of data in the core network offered the opportunity for cost savings by migrating to a data network infrastructure;[268] and 3) The potential for increased efficiency in the utilization of network resources.[269] However, by this time technology had evolved to the point that IP, ATM and voice-over packet technology were more practical network design alternatives for the integrated network than the ISDN of bygone years.[270]

Bellcore termed this new version of the integrated network the Next Generation Network (NGN), and conceived of it as a gradual migration from a voice-centric network to a data-centric network, which would protect current PSTN investments, re-use as much of the PSTN's infrastructure as is practical, enable seamless interoperability between PSTN and NGN services, and incrementally follow profitable demand for NGN services.[271] Bellcore's approach was to divide the PSTN to NGN evolution into four tasks, which could be planned for and treated separately.

1. Creation of a consolidated, packet transport and switching infrastructure, likely based on either IP, ATM, or both;

2. Gradual migration of the analog copper loop plant to a packet access technology capable of transporting data, voice and video services over the "last kilometer" to customers;

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266 Edward Traupman, Pete O'Connell, and John Minnis, Alcatel USA, Marc Jadoul and Huterer Mario, Alcatel, The Evolution of the Existing Carrier Infrastructure, IEEE Communications Magazine, June 1999, 134.

267 Edward Traupman, Pete O'Connell, and John Minnis, Alcatel USA, Marc Jadoul and Huterer Mario, Alcatel, The Evolution of the Existing Carrier Infrastructure, IEEE Communications Magazine, June 1999, 134; and Grant Lenahan, Executive Director, NGN Solutions, Bellcore, Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998 at 4.

268 Grant Lenahan, Executive Director, NGN Solutions, Bellcore, Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998 at 1.

269 Jo Van Gorp, Vice-President Legal & Regulatory Affairs and Bruno Vanneuville, Manager Regulatory Affairs Level 3 International, "Voice over IP and the Next Generation Network Response to the ART consultation on Internet Telephony", Level 3 Communications' Response To The Autorité De Régulation Des Telecommunications (ART) Public Consultation Document On "Internet Telephony", April 14, 1999, at 4.

270 Lenahan, Grant, Executive Director, NGN Solutions, Bellcore, Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998 at 4.

271 Id., at 5-6.

3. Development of a flexible, open, hardware independent services control and services development layers to handle voice telephony, as well as new data and mixed media services in the future, and

4. Development of Operation Support Systems (OSS) and business processes to manage the new infrastructure and services.[272,273]

This vision of how the network should evolve was shared by some of the major ILECs. For example, on June 8, 1998 Bell Atlantic announced that it was launching a next generation long distance data network. The company's stated reason for doing this was: "The market for data services in the region is expected to double and possibly triple to $80-90 billion a year, by the year 2003. The new network will support services such as virtual private networks, work-at-home and audio and video streaming over the World Wide Web."[274]

According to Stew Verge, president-Bell Atlantic Global Networks, Inc, this network was being designed to complement the high speed local loop services the Bell Atlantic telephone companies intended rolling out in 1998 and 1999 using asymmetric digital subscriber line (ADSL) technology.[275] From the beginning, it was Bell Atlantic's intent to eventually turn this network into a multiservice integrated network offering voice, data, and video over one network platform, as the following statement makes clear:

> "Bell Atlantic's new ATM/SONET data network will also be capable of emulating a circuit switched, voice network over a platform built and designed for data. Integrating voice capabilities adds to the cost-effectiveness of the network, and long distance voice services can be joint marketed with services from Bell Atlantic's local telephone companies. But delivery of voice services over the data network is contingent on gaining the necessary regulatory approvals for Bell Atlantic to enter the long distance voice business."[276]

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[272] Lenahan, Grant (Executive Director, NGN Solutions, Bellcore), Next Generation Networks: A Practical View of Network Evolution, http://www.telcordia.com/aboutus/vision/changingcommunications.html, December 1998, at 5-6.

[273] The Next Generation Network: How Do We Get There, Issue Brief #4, Telcordia Technologies, available at http://www.telcordia.com/newsroom/knowledgebase/briefs/ngn1issues.pdf, February 6, 2001, at 2.

[274] "Bell Atlantic Launches Next Generation Long Distance Data Network to Address $80 Billion Market for 21st Century Communications", PR Newswire, June 8, 1998 p608NYM008.

[275] Id.

[276] Id.

Furthermore, just recently, two more major ILECs announced their intention of following this path towards the converged Next Generation Network by converting their respective networks from circuit switched to packet switched.

> "Sprint's local telecommunications division (Sprint LTD) said it would be the first incumbent local exchange carrier in the U.S. to convert its entire local operation to a packet-switched network. ...[A]ccording to Mark Chall, vice president-network packet switching... the conversion would enable Sprint to expand its footprint to offer data services, frame relay, and digital subscriber line (DSL) services."[277]

Under a deal with Nortel Networks valued at $100 million to $200 million, Qwest will replace its traditional circuit-switched network with a packet-based network throughout its 14-state region. With the new switching, voice and data are sent in packets, enabling Qwest to deliver integrated video, voice, and data applications.[278]

Another factor driving the changes in network engineering was the passage of the Telecommunications Act of 1996, which, coupled with the huge increase in data traffic discussed earlier and competitive pressures from cable modem providers, propelled the ILECs to put the roll out of xDSL technologies in the forefront of their network development plans.

Many of the current xDSL technologies have requirements similar to the requirements outlined earlier for ISDN and addressed by the placement of DLCs according to the CSA network design. For example, the elimination of load coils by shortening loop lengths.[279] While it is currently estimated that the installed base of DLCs serves between 28% to 35% of the loops deployed in today's network,[280,281] unfortunately, the vast majority of these DLCs are narrowband and not equipped to support DSL without some infrastructure upgrades.[282] These can range from upgrades utilizing remote digital

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[277] "Sprint Local Service Plans Packet Network Conversion", Telecommunications Reports, November 12, 2001, http://www.tr.com/tronline/tr/2001/tr111201/Tr111201-21.htm

[278] Andy Vuong, "Qwest Turning to New Network", Denver Post, October 12, 2001

[279] "Reshaping Rural Telephone Markets: Financial Perspectives on Integrating Acquired Access Lines", Equity Research Report, LEGG MASON Research, Fall 2001, at 145.

[280] DSL Anywhere: A Paper Designed To Provide Options For Service Providers To Extend The Reach Of DSL Into Previously Un-Served Areas, a DSL Forum Whitepaper submitted December 12, 2001 in the National Telecommunications and Information Docket No. 011109273-1273-01, In the Matter of Request for Comments on the Deployment of Broadband Networks and Advanced Telecommunications, available at http://www.ntia.doc.gov/ntiahome/broadband/comments/dslf/dsl_anywhere.pdf, at 6.

[281] Broadband "Everywhere" in Telephone Company Networks: A Case for Loop Extenders, May 2001, Symmetricon, available at http://www.symmetricom.com/products/download/bn_052101.pdf, at 6.

[282] DSL Anywhere: A Paper Designed To Provide Options For Service Providers To Extend The Reach Of DSL Into Previously Un-Served Areas, a DSL Forum Whitepaper submitted December 12, 2001 in the National Telecommunications and Information Docket No. 011109273-1273-01, In the Matter of Request

subscriber line access multiplexers (DSLAMs), integrated POTS+DSL line cards, remote-access multiplexer (RAM) solutions, to the replacement of legacy DLC with next generation digital line carriers (NGDLCs) or the more newly developed broadband loop carriers (BLCs).[283] For central office feed lines within 12k ft of the central office, central office DSLAMs are required for the provision of xDSL. For those cases involving lines beyond 17k ft to 18k ft, new technologies such as "improved" DSL and low frequency DSL are available.[284]

Regardless of the engineering and technological solutions employed in eventually deploying xDSL, the fact of the matter remains that its deployment will, in most cases, necessitate a re-engineering of the local loop plant and the central office switching equipment. Once again, this upgrade of the network will be performed to meet the demands of a non-voice, advanced services and will provide no significant benefits to voice only users of the network. Moreover, it is apparent that the ILECs are intent on providing this service to their customers.

For example, BellSouth's CEO sees DSL as a top priority and expects the revenue stream to be somewhere close to $600 million a year off the DSL product along.[285] Likewise Verizon is very committed to the roll out xDSL services, which it began doing in the form of ADSL in 1995.[286] Then there is SBC, which has recently announced that:

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for Comments on the Deployment of Broadband Networks and Advanced Telecommunications, available at http://www.ntia.doc.gov/ntiahome/broadband/comments/dslf/dsl anywhere.pdf, at 6. Concerning the contention that most DLCs currently in the network must be upgraded to provide DSL see also, Local Loop 101: Technical Brief, OCCAM Networks, May 2001, available at http://www.occamnetworks.com/pdf/Local loop.pdf; and Extending Asymmetric Digital Subscriber Line (ADSL) Services to Remote Digital Loop Carrier (DLC) Locations, The International Engineering Consortium, Web ProForum Tutorials, http://www.iec.org, at 1.

[283] DSL Anywhere: A Paper Designed To Provide Options For Service Providers To Extend The Reach Of DSL Into Previously Un-Served Areas, a DSL Forum Whitepaper submitted December 12, 2001 in the National Telecommunications and Information Docket No. 011109273-1273-01, In the Matter of Request for Comments on the Deployment of Broadband Networks and Advanced Telecommunications, available at http://www.ntia.doc.gov/ntiahome/broadband/comments/dslf/dsl anywhere.pdf, at 9; and Extending Asymmetric Digital Subscriber Line (ADSL) Services to Remote Digital Loop Carrier (DLC) Locations, The International Engineering Consortium, Web ProForum Tutorials, http://www.iec.org, at 3-11.

[284] DSL Anywhere: A Paper Designed To Provide Options For Service Providers To Extend The Reach Of DSL Into Previously Un-Served Areas, a DSL Forum Whitepaper submitted December 12, 2001 in the National Telecommunications and Information Docket No. 011109273-1273-01, In the Matter of Request for Comments on the Deployment of Broadband Networks and Advanced Telecommunications, available at http://www.ntia.doc.gov/ntiahome/broadband/comments/dslf/dsl anywhere.pdf, at 9.

[285] Robert Luke, "BellSouth sees new era Seamless broadband world will streamline data connections, CEO predicts", Interview with F. Duane Ackerman, BellSouth CEO, The Atlanta Journal-Constitution, Atlanta Technology Wednesday, December 5, 2001. In this same article, Mr. Ackerman goes on to state that "Long-distance entry is important from a voice point of view. But it's also important from a data point of view, where we've seen growth in the high 20 percent range."

[286] Raymond W. Smith, Chairman of the Board and Chief Executive Officer, Bell Atlantic Corporation, 1995 Annual Report of the Bell Atlantic Corporation, "Letter to Shareowners", at Page 4.

- 1,300 SBC central office switches have been upgraded to support DSL, roughly 90% of the original goal;

- 3,000 of the 20,000 planned remote fiber nodes have been installed. SBC needs these to keep DSL loop distances less than 12,000 feet, the optimal distance for DSL; and

- It has installed 954,000 DSL access lines.[287]

As has been demonstrated the guiding principle behind the development of the network from the introduction of the T-1 carrier system in the 1960's up to today's evolving integrated Next Generation Network has been to evolve the network toward meeting the needs of non-voice advanced services. Given this fact, it is clear that the primary "cost causers" driving network access costs today, and for the foreseeable future, are the users of these non-voice advanced services such as xDSL, peer-to-peer computing, online gaming and the like. Economic theory stresses that to maximize society's welfare, basic telephone service should only bear a portion of the cost of upgrading the network to satisfy the more stringent requirements of non-basic services. The additional charges to basic services should be based on the value of the improved, plain-old-telephone service.[288] For these reasons basic local exchange services should be insulated from the cost effects generated by developing the network to meet the needs of non-voice advanced services.

8.3 The FCC Was Well Aware of the Changes Taking Place in the Network and Actively Developed Policies to Promote the Development of Advanced Services

The FCC has for many years been actively promoting the re-engineering of the PSTN for the provision of non-voice advanced services. This policy accelerated with the passage of the Telecommunications Act of 1996. In its Local Competition First Report and Order, the FCC noted that:

> "Our definition of loops will in some instances require the incumbent LEC to take affirmative steps to condition existing loop facilities to enable requesting carriers to provide services not currently provided over such facilities. For example, if a competitor seeks to provide a digital loop functionality, such as ADSL, and the loop is not currently conditioned to carry digital signals, but it is technically feasible to condition the facility,

[287] John Dix, Project Pronto Bucking Along With Fiber Help, Network World, 05/21/01, available at http://www.nwfusion.com/columnists/2001/0521edit.html.

[288] See, for example, Sickler, J. "A Theory of Telephone Rates", Journal of Land and Public Utility Economics 4, 177 (1928).